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March 18, 1991

Mr. Matt Haber  
Chief, New Source Section  
U.S. Environmental Protection Agency  
75 Hawthorne Street  
San Francisco, CA 94105

RE: El Paso Natural Gas Company PSD Applications Window Rock (AZP-90-1) and Navajo (AZP-90-2) Stations

Dear Mr. Haber:

On behalf of El Paso Natural Gas Company (EPNG), ENSR Consulting and Engineering is pleased to submit additional information related to EPNG's current PSD applications to add additional pipeline gas compression along their San Juan Mainline on the Navajo Indian Reservation in Arizona. The additional compression is required for expansion of the San Juan Mainline system. This information relates to the Window Rock and Navajo Stations only. Proposed operations at other compressor stations is unchanged from data previously submitted to EPA.

In the original applications for the Window Rock and Navajo Stations, EPNG proposed to add one General Electric (GE) Frame 3 turbine to each station. However, based on a necessity to phase the expansion and related gas volumes as well as new engineering design, EPNG has determined that Solar Centaur H turbines will be installed instead of the GE Frame 3s. Emissions data on the Solar Centaur H for each station are attached. In addition, the location of the new Solar turbines on the project site has changed from those of the GE Frame 3s.

Because these modifications reduce the expected emissions and affect the plant configurations, ENSR (on behalf of EPNG) has updated the dispersion modeling studies provided in the Window Rock and Navajo applications. We have also taken advantage of this opportunity to make certain corrections to the engineering data in the application as well as increase the level of sophistication in the modeling in order to increase the accuracy of the dispersion modeling results. We have also revised the information on Best Available Control Technology (BACT) to reflect the change from GE Frame 3 to Solar Centaur H turbines.

#### Dispersion Modeling

Fundamentally, there are no major differences in the approach used to conduct the dispersion modeling compared to the original application submittals with the exception that a "second-level" ozone limiting approach has now been applied to better approximate NO-to-NO<sub>2</sub> conversion in the compressor plumes. Ambient ozone data to use the second-level ozone limiting approach were taken from data collected at Petrified Forest National Park by the National Park Service. However, since the period of record for the ozone data does not exactly match the meteorological data used for modeling, a "worst-case" hourly ozone file was constructed. This was done on a monthly basis by examining the hourly ozone data and deriving a diurnal ozone concentration profile by using the 90th percentile ozone concentration for each hour. The diurnal ozone concentration profile derived



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for each month is attached for your review. This approach allowed derivation of a realistic ozone profile accounting for the known seasonal and diurnal variability of ozone concentrations, yet maintains a substantial degree of conservatism. ENSR has previously discussed this approach with Mr. John Vimont of your staff and he has concurred with its application on the EPNG modeling.

Please note that the second-level ozone limiting approach can be applied only for the ISCST modeling which uses sequential meteorological data. For the complex terrain modeling, which uses a wind rose in a VALLEY-type model, it was necessary to retain the first-level ozone limiting approach as described in the original permit documents.

In preparing the revised modeling, ENSR also uncovered some minor errors in the original modeling, primarily specification of certain building parameters at the Navajo Station. These have been corrected in the revised modeling.

The attached tables provide the updated modeling results of projected impacts from the Window Rock and Navajo Stations. For convenience, the table numbering is the same as provided in the original permit applications. The results continue to show that the emissions from the Window Rock and Navajo Stations will comply with all air quality standards and increments. Computer output from the worst-case years identified during the modeling are provided for your review.

#### Best Available Control Technology

The switch from GE Frame 3 to Solar Centaur H turbines also affects the BACT assessment. The Solar turbines are smaller (i.e. approximately 4,000 vs. 9,500 hp) and produce substantially less NO<sub>x</sub> (i.e. approximately 80 vs. 150 ppm). This affects the degree of control offered by post-combustion NO<sub>x</sub> control techniques and their relative cost.

The basic NO<sub>x</sub> control techniques applicable to the Solar turbines are the same as discussed in the permit application for the GE Frame 3s. Selective catalytic reduction (SCR) is commonly applied to turbines in cogeneration service, and in some applications can achieve NO<sub>x</sub> control of up to 90 percent or better. However, turbines in pipeline compression service experience wide fluctuations in operational conditions such as inlet NO<sub>x</sub> concentration and temperature. Under such conditions, SCR cannot operate at 90 percent NO<sub>x</sub> removal and still maintain reasonable levels of ammonia slip. EPNG has previously supplied technical data related to application of SCR to the GE Frame 3s at the Window Rock and Navajo stations. These data are also transferable to the Solar Centaur H turbines.

The other presently available NO<sub>x</sub> control technique is water injection. Water injection generally provides an outlet NO<sub>x</sub> level of about 42 ppm independent of the uncontrolled NO<sub>x</sub> level. For the Solar Centaur turbine, this equates to about 50 percent NO<sub>x</sub> control.

A newly developing technology is dry low-NO<sub>x</sub> liners (DLN), which is expected to provide control of NO<sub>x</sub> emission levels roughly equivalent to water injection, or about 42 ppm. On the Solar Centaur, this technology is expected to be in commercial use by 1994. On the GE Frame 3s, EPNG had committed to retrofitting DLN to the new turbines upon its commercial availability. However, with the switch to the Solar machines and their inherently lower NO<sub>x</sub> emissions, EPNG has reevaluated this commitment. A complete economic evaluation of DLN applied to the Solar Centaur H is provided herein.





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The attached tables also provide the updated BACT information as it applies to the proposed Solar turbines at Window Rock and Navajo. As before, the table numbering is the same as in the original applications to facilitate your review. This evaluation shows all the potential add-on or retrofit controls to be prohibitately expensive and not within the norms for application as BACT. For SCR, control costs are nearly \$25,000 per ton of NO<sub>x</sub> removed. Control costs are also over \$25,000 per ton for water injection and over \$10,000 per ton for retrofit of DLN technology. As these costs exceed the normal criteria for BACT, none of the reviewed technologies qualify as BACT. For the Window Rock and Navajo Solar Centaur turbines, BACT is represented by the existing dry combustion control technology.

If you have any questions or require additional information to continue and complete the application review, please contact me at your earliest convenience.

Sincerely,

A handwritten signature in black ink, reading "D. Howard Gebhart". The signature is written in a cursive, flowing style.

D. Howard Gebhart  
Senior Air Quality Scientist  
Air Resource Studies Department

DHG/dw

Ref: 2467-005.E32

Enc.

cc: Loren Gearhart, El Paso Natural Gas  
Prabhat Bhargava, Arizona DEQ

Table A

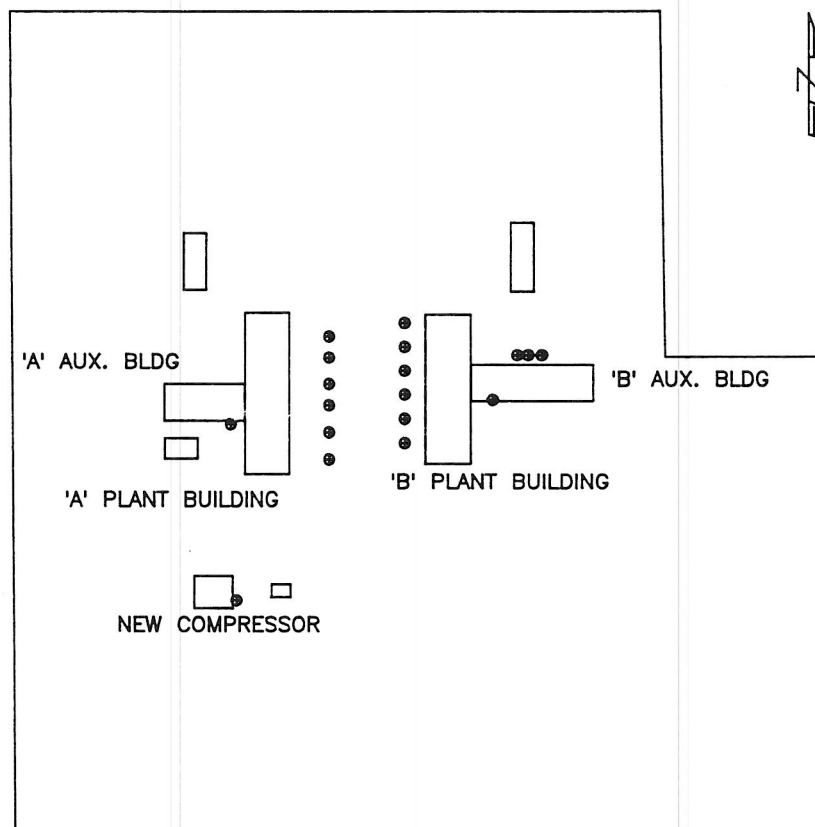
Diurnal Ozone Concentration Profile (Parts per Billion)<sup>1</sup>  
for EPNG Ozone Limiting Modeling

HOUR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	38	38	44	44	48	43	45	39	43	32	35	38
2	40	36	40	44	46	40	43	34	41	33	39	38
3	37	34	46	43	50	41	45	30	38	32	37	38
4	37	33	44	44	48	36	39	31	36	28	35	37
5	39	32	44	45	44	32	40	31	30	34	34	37
6	38	33	39	42	43	33	39	27	30	29	31	38
7	38	33	39	44	49	36	40	35	32	29	31	34
8	34	33	38	44	49	36	40	35	32	28	30	38
9	33	31	44	46	54	46	47	44	35	35	33	36
10	35	35	46	49	58	53	55	51	48	41	38	36
11	40	39	47	54	60	58	60	54	56	44	49	40
12	42	40	51	54	60	62	63	58	56	47	48	39
13	44	42	49	55	60	60	62	59	52	47	43	42
14	45	45	51	53	59	61	61	58	55	47	42	42
15	45	42	50	53	61	62	63	54	57	48	42	43
16	47	41	51	51	61	59	61	54	55	47	43	45
17	50	43	47	52	60	56	61	52	57	47	43	44
18	53	42	47	52	60	57	60	50	55	49	43	42
19	51	42	49	53	57	58	56	51	53	47	43	41
20	51	42	46	49	54	56	54	50	54	46	41	40
21	46	41	45	47	56	47	53	46	54	47	38	39
22	42	40	45	47	55	48	50	43	46	39	37	38
23	39	40	44	44	51	47	49	39	45	37	36	38
24	40	40	44	44	52	45	48	39	44	34	32	37

<sup>1</sup>Values are 90th percentile for that hour among all days in the month.



## WINDOW ROCK TABLES



1 inch = 235 feet

FIGURE 2-3. WINDOW ROCK COMPRESSOR STATION SITE PLAN  
(REVISED MARCH 1991)

TABLE 2-2 (REVISED MARCH 1991)  
EL PASO NATURAL GAS COMPANY - WINDOW ROCK  
DOCUMENTATION FOR SOLAR CENTAUR H TURBINE

HEAT RATE @ 59F      LHV      FUEL  
(BTU/HP-HR \* HP)/(BTU/SCF) = SCFH    2933.419 <= LBS/HR OF FUEL  
( 9053 \* 3992)/( 932.97) = 38736.54

	LBS/FT3 FUEL	* SCFH =	LBS/HR	TPY
CO2	0.121754	38736.54	4716.332	20658
N2	2.084725	38736.54	80755.06	353707
O2	0.456584	38736.54	17686.49	77467
H2O	0.095992	38736.54	3718.427	16287
SUB TOT	2.759056		106876.3	

	FT3/FT3 FUEL	* SCFH =	FT3/HR	CONC %V
CO2	1.0487	38736.54	40623.01	2.8585%
N2	28.20423	38736.54	1092534.	76.8789%
O2	5.409764	38736.54	209555.6	14.7459%
H2O	2.0209	38736.54	78282.68	5.5086% H2O
SUB TOT	36.68359		1420995.	99.9919%

	LBS/HR	* FT3/LB =	FT3/HR	TPY	
NOX	12.396	8.248206	102.2447	54.29	0.0072%
CO	0.740	13.54844	10.02584	3.24	0.0007%
VOC	0.480	5.259802	2.524705	2.10	0.0002%
SO2	0.016	5.924226	0.094598	0.07	0.0000%
SUB TOT	13.63196		114.8899		0.0081%

TOT #/HR=> 106890 FT3/HR=> 1421110. 100.0000%

$$84.9 \text{ ppmV NO}_x @ 15\% \text{ O}_2 = \frac{5.9 * [72 \text{ ppmV} / (1 - 0.055086)]}{20.9 - [14.7459 / (1 - 0.055086)]}$$

$$12.4 \text{ lb/hr NO}_x = 54.29 \text{ Ton/YR} * \frac{1 \text{ YR}}{365 \text{ DAY}} * \frac{1 \text{ DAY}}{24 \text{ HRS}} * \frac{2000 \text{ lb}}{1 \text{ TON}}$$



TABLE 3-2 (REVISED MARCH 1991)  
 WINDOW ROCK EMISSIONS DATA  
 PROPOSED SOLAR CENTAUR H TURBINE

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NO<sub>x</sub>: Basis 72 ppmv

$$\frac{(72.0 \text{ ppmv}) (46.01 \text{ lb NO}_x/\text{lb-mole}) (106,890 \text{ lb/hr stack gas})}{(28.51 \text{ lb stack gas/lb-mole}) (1,000,000)} = 12.4 \text{ lb/hr}$$

CO: Basis 7 ppmv

$$\frac{(7.0 \text{ ppmv}) (28.01 \text{ lb CO/lb-mole}) (106,890 \text{ lb/hr stack gas})}{(28.51 \text{ lb stack gas/lb-mole}) (1,000,000)} = 0.7 \text{ lb/hr}$$

HC: Basis 0.2 lb/10<sup>3</sup> hp-hr

$$(0.2 \text{ lb/10}^3 \text{ hp-hr}) (3,992 \text{ hp}) = 0.8 \text{ lb/hr}$$

SO<sub>2</sub>: Basis 0.004 lb/10<sup>3</sup> hp-hr

$$(0.004 \text{ lb/10}^3 \text{ hp-hr}) (3,992 \text{ hp}) = 0.02 \text{ lb/hr}$$

PM: Basis 5.0 lb/10<sup>6</sup> scf gas burned

$$(5.0 \text{ lb/10}^6 \text{ scf}) (38,737 \text{ scf/hr}) = 0.2 \text{ lb/hr}$$


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TABLE 3-3 (REVISED MARCH 1991)  
PSD APPLICABILITY DETERMINATION<sup>1</sup>  
WINDOW ROCK STATION

	NO <sub>x</sub>	CO	HC	SO <sub>2</sub>	PM <sup>2</sup>
Proposed Emissions (tpy)	3,471.9	445.1	1,382.3	0.7	6.2
Existing Emissions (tpy)	3,417.6	442.1	1,378.8	0.6	5.3
Net Change (tpy)	54.3	3.0	3.5	0.1	0.9
PSD Significant Emission Rate (tpy)	40.0	100.0	40.0	40.0	15.0

<sup>1</sup> All other regulated pollutants are not emitted at the source.

<sup>2</sup> It is assumed that all PM is PM-10.



P. O. BOX 1492  
EL PASO, TEXAS 79978  
PHONE: 915-541-2600

May 20, 1991

Mr. Matt Haber  
USEPA Region 9  
75 Hawthorne Street  
San Francisco, CA 94105

Re: Final Description of El Paso Natural Gas  
Facilities for Air Permits on the  
Navajo Indian Reservation

Dear Mr. Haber:

On May 9, 1991, I talked with Mr. Gerardo Rios of your staff to arrange a meeting to discuss progress on PSD permit applications currently pending for four El Paso Natural Gas transmission facilities located in Region 9 in Arizona on the Navajo Indian Reservation. The four facilities include Window Rock (Application AZP-90-1), Navajo (AZP-90-2), Dilkon (AZP-90-3) and Leupp (AZP-90-4) Compressor Stations. Because considerable new information has been provided to your Agency since the original applications were filed and indeed the scope of the project has changed somewhat, Mr. Rios requested a summary of (1) the latest status of the projects, and related permit requirements and (2) a description and accounting of information submitted since the original applications were filed in July. This letter is submitted to respond to that request and to hopefully facilitate our meeting which will be held in your offices on May 23, 1991.

Current Source Description

On June 21, 1990 El Paso submitted a letter to you which contained information on the existing sources at the four locations. Much of the information is still valid. At the time of the letter, El Paso fully expected to place additional compression at the four locations, based on market demands understood at that time. Because of the long lead time (1 year +) necessary to obtain PSD permits, we began the permitting process in July 1990 for the four locations with expectations that permits would be issued to begin construction by July 1991. As contract negotiations have progressed and are now finalized, the amount of additional gas volumes requiring compression have diminished so that only three locations (Window Rock, Navajo, and Dilkon) will require additional compression. The compression at Leupp Station is no longer needed. Accordingly, the following information on the existing horsepower at the three locations is provided based on EPA AP 42 factors unless otherwise noted:



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(1) Window Rock Compressor Station (Existing)

- Reciprocating Engines  
32,540 (site) horsepower 3420.6 TPY NOx
- Two Small Boilers @ 1.55 TPY each x  $\frac{2 - 3.1 \text{ TPY NOx}}{3423.7 \text{ TPY NOx}}$

(2) Navajo Compressor Station (Existing)

- Reciprocating Engines  
28,314 (site) horsepower 2976.4 TPY NOx

(3) Dilkon Compressor Station (Existing)

- One Centrifugal Engine 192.3 TPY NOx (Mfg Data)  
(GE Frame 5 Turbine)

Specific information on existing equipment can be found at Tables 2-1 and 3-1 of the PSD Applications for Window Rock, Navajo, Dilkon prepared by ENSR in July 1990. Moreover, air quality impacts from the existing sources at all three locations are examined in Chapter 5 of the original applications plus supplemental impact information for Window Rock and Navajo (reflecting a downsizing) was provided in a memo dated March 18, 1991 from ENSR.

Proposed Modifications

As previously stated, the amount of new horsepower required has diminished to such an extent that only three new turbines are required (one GE Frame 3-Model "J" at Dilkon, one Centaur II at Window Rock and one Centaur H at Navajo). Accordingly, the following summary of new compression is provided.

Window Rock Compressor Station

- Add one additional 3992 (site) 54.3 TPY NOx  
horsepower Solar Centaur H Turbine

Navajo Compressor Station

- Add one additional 4111 (site) 55.9 TPY NOx  
horsepower Solar Centaur H Turbine

Dilkon Compressor Station

- Add one additional 11033 (site) 326.3 TPY NOx  
horsepower GE Frame 3 Model "J"  
Turbine

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- Uprate of existing GE Frame 5 is not required

Specific information on the proposed turbine at Dilkon can be found at Tables 2-2 and 3-2 of the July 1990 PSD application for Dilkon. It should be noted that a computational error has been found in the site horsepower indicated on table 2-2 submitted in July 1990, however, the calculated emission rate is unchanged. For consistency sake, a revised Table 2-2 for Dilkon with the corrected site horsepower is provided. (Tab 1)

Specific information on the proposed turbines at Window Rock and Navajo can be found at Table 2-2 (Revised March 1991) and 3-2 (Revised March 1991) in the March 18, 1991 memo from ENSR.

The existing and proposed (downsized) NOx emissions can therefore be summarized by the following table:

<u>Site</u>	<u>Existing*</u>	<u>Proposed Increase</u> *
Window Rock	3224	54.3 (Centaur H)
Navajo	2976	55.9 (Centaur H)
Dilkon	192	326.3 (GE Frame 3 - Model "J")

\* Tons per year NOx

The above table shows that proposed increases at all three locations will trigger PSD permitting. The stated emissions rates do not reflect emissions controls.

#### Best Available Control Technology

Without any doubt, the most dynamic of the changes which have come about in El Paso's PSD applications is the level and type of emissions control which will eventually be installed on the new emissions sources. Because specific BACT for the Window Rock and Navajo Centaurs has not yet been discussed, it would be impossible to include detailed discussions on that subject. Indeed, BACT for the Centaur H's will be one of the discussion items during our May 23 meeting.

Considerable additional information on what constitutes BACT for the GE Frame 3 has been submitted since the original applications were filed.

A brief chronology of events and submittals can demonstrate how BACT has successfully been resolved for the GE Turbine to be installed at Dilkon. In a meeting with Region 9 on July 31, 1990 to discuss the PSD applications submitted a few weeks earlier, we were told that you were not persuaded that dry combustion NOx controls (No Controls) constituted BACT. Moreover, you indicated

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that unless persuasive arguments could be developed, the Agency was comfortable with SCR as a control device because it had been successfully installed on turbines in electric cogeneration service. El Paso immediately began discussions with our vendors (GE and Solar) and began asking gas transmission industry representatives about their research into emissions controls. On August 15, the Agency issued a completeness notice for the applications indicating that Endangered Species and Soils and Vegetation Analyses should be submitted. This information was submitted in October 1990. The letter was careful to point out that the Agency did not necessarily agree that "No Controls" constituted BACT.

In order to work effectively, emissions controls must work at remote, unattended sites, be reliable, have low maintenance cost and overall be cost effective. More importantly, they must be able to operate over wide flow fluctuations (not base loaded) which are typical of natural gas transmission service and they must work on the types of turbines used in the industry. On October 18, ENSR submitted technical information on SCR controls which began the information exchange to explain why SCR was a problematic control method given these considerations. Also in October, El Paso commissioned a study by Dr. Robert Becker of ENVIRONEX to review El Paso's operational flow data along the gas transmission line and turbine exhaust characteristics. The objective of the study was to design an SCR control systems for El Paso turbines (GE Frames 3's) and to evaluate other control methods (i.e., water or steam injection and Selective Non-Catalytic reduction).

El Paso's inquiries bore fruit and on November 27 we met again with Region 9. At that meeting we were able to show that another gas transmission company (PGT) had negotiated the placement of a new 12,000 (ISO) horsepower Solar Mars turbine (a unit with comparable horsepower to GE Frames 3's) and would install emissions control (low - NOx combustors) no later than September 30, 1994. The turbine would be installed in 1990 with no controls and then retrofitted by that later date. Moreover, by the time of the meeting we had received written notice from GE that low-NOx combustors would be available for GE Frame 3's in the same general time frame as Solar units. GE committed to emissions at least as good as steam injection, i.e., 42 ppmvd @ 15% oxygen. Copies of this information was provided at that meeting for the record. On January 15, 1991 revised BACT analyses prepared by Dr. Becker, were submitted for Window Rock, Navajo and Dilkon for proposed GE's. These analyses showed that SCR removal efficiency can only be 70% (not 90% as originally thought) given the operational realities of our turbines and that for GE Frame 3's Dry Low NOx (DLN) combustors were BACT. The information was valid for Window Rock and Navajo because the decision to downsize had not been made.

The record is now clear that, for GE Frame 3's, BACT is DLN. This conclusion may not be valid for Centaur H's however. On March 18, 1991 ENSR submitted, on behalf of El Paso, additional information on the downsized project (as previously described) at Window Rock and Navajo. That submittal showed that, while technically feasible in 1994, the costs related to DLN control for the Centaur H's are too high to be considered BACT. It is unfortunate that this



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reality exists and we are hopeful that this development is not seen by the Agency as a "backing away" from El Paso's commitment to install DLN on the GE Frame 3 at Dilkon. Nothing could be further from the truth. Obviously, we must discuss the ramifications of these finding for Window Rock and Navajo. I am confident that a mutually satisfactory resolution will be found.

#### Other Minor Issues

On May 9, 1991, I faxed a copy of a letter to your office describing certain new developments for the four PSD applications. For the sake of completeness, I will further describe each item in that letter. Hopefully these issues are not major impediments towards the issuance of permits.

1. The downsizing of the project is described fully in this letter. The only unresolved matter is BACT for the Centaur H's at Window Rock and Navajo.
2. The original application for Dilkon sought the placement of 2 new GE Frame 3's and an uprate of the existing GE Frame 5. Modeling performed for the 671.9 TPY NOx incremental increase related to these sources showed no exceedances of ambient standards. The proposed (downsized) project seeks only one new GE Frame 3 and no uprate of the existing Frame 5, or and incremental NOx increase of only 326.3 TPY. Because of the critical need for full time electrical power at Dilkon, our engineering and operations personnel are asking us to add a small new 350 kw standby generator to the permit application. This unit will be powered by a 738 (ISO) horsepower engine and will operate only 100 hr a year. Based on AP-42 the emission from this unit will only be approximately 0.89 TPY NOx. Because the cumulative emissions from the new GE Frame 3 and the standby generator will be only slightly more than 327 TPY NOx (344.7 TPY less than modeled) it would seem reasonable that a comprehensive new modeling exercise would not be required to permit the new standby generator; we hope you concur.
3. The original July 1990 application for Dilkon contained a computational error in Table 2-2. A corrected table is included in Tab 1. The emission rate for the proposed new turbine is unchanged from that filed.
4. As you may know, the Albuquerque Regional Office of the Forest Service (which has jurisdiction over Arizona and New Mexico) has been an active commentator on an El Paso application with EPA Region 6 for a new source (White Rock Compressor Station) located northeast of Window Rock Station. The Forest Service has expressed concerns about the impacts of the proposed White Rock source on a Class I area (The San Pedro Park Wilderness) located approximately 125 kilometers away. While we do not anticipate active Forest Service

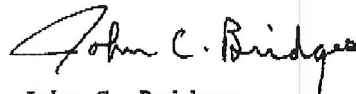
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comments on the applications for Window Rock, Navajo, and Dilkon we have contacted the Arizona Forest Service to share our findings regarding the White Rock impacts (or more properly non-impacts).

5. EPA Region 6 issues a permit which is not final until an additional 30 day comment period passes. The impacts on construction and procurement contracts are obvious. Does Region 9 utilize this procedure?
6. El Paso has investigated the installation and operation of continuous monitoring system at several cogeneration turbines in California. We are greatly concerned about the ability to install and operate such units at remote, unattended sites like those that are the subject of this letter. El Paso would welcome the opportunity to discuss equivalent alternatives to such devices.

In closing, I would like to thank you for the opportunity to discuss the issues raised in this letter. Hopefully, this letter is responsive to Mr. Rios' needs and will serve as a way to focus discussions during over meeting on May 23 in your offices. Almost 10 months have passed since El Paso first filed its PSD applications, I believe were are indeed close to beginning the final negotiations on actual draft permit language. See you on May 23!

Sincerely,



John C. Bridges  
Environmental Consultant  
Environmental Affairs Department

JCB:aln

Enclosure

DOCUMENTATION FOR EMISSION SOURCES TABLE 2-2 (Revised May 1991)  
GE MODEL 3142J AT DILKON

HEAT RATE @ 59F LHV FUEL  
(BTU/HP-HR \* HP)/(BTU/SCF) = SCFH 3930.864 <=LBS/HR OF FUEL  
7410 11033 932.97 87628.30 17.0 <=MOL WT OF FUEL

LBS/FT3 FUEL \* SCFH = LBS/HR TPY  
CO2 0.121754 87628.30 10669.10 46731  
N2 2.892943 87628.30 253503.7 1110346  
O2 0.700727 87628.30 61403.55 268948  
H2O 0.095992 87628.30 8411.681 36843  
SUB TOT 3.811418 333988.0

FT3/FT3 FUEL \* SCFH = FT3/HR CONC %V  
CO2 1.0487 87628.30 91895.80 2.0758%  
N2 39.13861 87628.30 3429650. 77.4722%  
O2 8.302457 87628.30 727530.2 16.4341%  
H2O 2.0209 87628.30 177088.0 4.0002%  
SUB TOT 50.51067 4426164. 99.9824%

LBS/HR \* FT3/LB = FT3/HR TPY  
NOX 74.500 8.248206 614.4914 326.31 0.0139%  
CO 12.136 13.54844 164.4281 53.16 0.0037%  
VOC 0.221 5.259802 1.160629 0.97 0.0000%  
SO2 0.044 5.924226 0.261448 0.19 0.0000%  
SUB TOT 86.90110 780.3415 0.0176%

TOT #/HR=> 334075 FT3/HR=> 4426944. 100.0000%

LBS/HR NOX =  $\frac{\text{PPMV} * (\text{MOL WT NOX}) * (\text{LBS/HR STACK GAS})}{(\text{MOL WT STACK GAS}) (1,000,000)}$   
@ 59 F  
74.6 =  $\frac{139 * (46.01) * (334,075)}{(28.60) (1,000,000)}$

LBS/HR CO =  $\frac{\text{PPMV} * (\text{MOL WT CO}) * (\text{LBS/HR STACK GAS})}{(\text{MOL WT STACK GAS}) (1,000,000)}$   
@ 59 F  
12.2 =  $\frac{37 * (46.01) * (334,075)}{(28.60) (1,000,000)}$

225.6 PPMVD =  $\frac{5.9 * [138.81 \text{ PPMV} / (1 - 4.0002\% \text{ H}_2\text{O})]}{20.9 * [16.43\% \text{ O}_2 / (1 - 4.0002\% \text{ H}_2\text{O})]}$   
NOX @ 15% O2

October 3, 1991

Mr. Gerardo C. Rios (A-3-1)  
U. S. Environmental Protection Agency  
Region IX  
75 Hawthorne Street  
San Francisco, California 94105

Reference: El Paso Natural Gas Comments on Public Notice No. AZP 90-1  
(Window Rock Compressor Station)

Dear Sir:

On October 2, 1991, El Paso Natural Gas (El Paso) provided verbal comments on the reference permit application during a meeting with you. El Paso and Solar representatives were in San Francisco that day to meet later with you and Mr. Steven Frey about the "CEM issues" addressed in the draft permit so Loren Gearhart and I took the opportunity to met with you early in the morning to deliver our verbal comment on the referenced draft permit and public notice documents. Every attempt was made to get together earlier in the week, or even last week, but Agency scheduling problems necessitated delaying the meeting until October 2, 1991. While we appreciate the fact that we were able to provide our comments before the deadline at October 4, 1991, there may be some additional data or information which was identified during our CEM meeting which must be provided after the formal comment period. Nonetheless, these written comments are intended to document those verbal discussions for the record. It is our understanding that because most, if not all, of El Paso's comments are minor clarifications on typographical/computational errors the comment period deadline does not change.

Overall El Paso is satisfied with the Agency conclusion that based on information submitted, and the review of criteria established by 40CFR52.21, that the referenced project will not cause, or significantly contribute to, a violation of any National Ambient Air Quality Standards on the Navajo Reservation. El Paso is heartened that EPA has indicated an intent to approve the project. Indeed our primary concern, and the focus of these written comments, is on the conditions of the draft project permit. El Paso's only desire is to secure a permit with conditions which are realistic and workable that address the remote, unattended nature of our natural gas transmissions operations. To facilitate an understanding of these comments, page numbers of the public notice documents are used.

1. Ambient Air Quality Impact Report (AAQIR) (AZP 90-01) comments on this part of the public notice (the AAQIR) are merely for the record and are intended to provide supplemental information for El Paso's later specific comments on the draft permit and related conditions.

page 1 The "Process Systems" section record should indicate that the maximum

natural gas compression dedicated horsepower is 30,500 hp from the 12 existing compressors, and that an additional 2040 existing horsepower at the site is dedicated to electric generator to supply the electrical demands of the plant. The 3992 (site) hp turbine will be an incremental additional to the existing plant. As currently worded, the 2040 horsepower dedicated to electric generation, which will remain, could be overlooked.

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The "Emissions from the Project" section must show that the total potential emissions are 3417.6 tons/yr. NO<sub>x</sub>. The record should also indicated that the 2933.4 lb/hr of fuel is not a maximum as currently worded but is an average rate. This comment is recurrent throughout El Paso's comments on Navajo, Window Rock, and Dilkon Compressor Stations. The fuel use data submitted in the revised application for this project was never intended or so indicated as a maximum.

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#### BACT Nitrogen Oxides

The second paragraph states that there are functional differences between gas turbine compressor and gas turbines that produce electricity, and that SCR alone does not achieve the amount of control (9 ppm) on gas turbines which produce electricity. The record should show that the statement is not entirely correct and can be misleading. First the record should indicate that there are functional differences between natural gas transmission turbine compressors (emphasis added) and second that 9 ppm is achievable through the application at both water injection and SCR. Moreover, the 9 ppm level required is lowest achievable emissions recovery (LAER) not BACT.

The record should reflect the fact that the vendor commitment is "42 ppm of NO<sub>x</sub> (corrected to 15% O<sub>2</sub> on a dry basis) at full load design conditions corrected to ISO ambient conditions". Because the hardware has not been thoroughly developed and evaluated the vendor cannot guarantee the rate as of yet. Quarterly reports required as a permit condition, will greatly help El Paso and the Agency better understand this developing emissions control technology.

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El Paso is pleased that low NO<sub>x</sub> combustors have been found to be BACT for this source. We are encouraged that the Agency recognizes that this turbine powered transmission compressor station is remote and that these combustors will not require the addition of personnel to maintain complicated, sophisticated control technology like SCR and water injection. Water is indeed a scarce commodity on the Indian Reservation. El Paso is concerned too about potential environmental hazards and hazardous air pollutants that could result from water injection and SCR. Finally, El Paso feels that EPA gave appropriate considerations to the costs and technical feasibility for SCR and water injection and rejected the technology for pipeline applications.

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#### Visibility

El Paso accepts and agrees with the EPA finding that the modification will

not cause perceptible changes in visibility in any of the Class I areas of concern.

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### Conclusion and Proposed Action

El Paso feels that EPA has made the proper decision to issue the permit. On August 15, 1990, EPA responded to El Paso's application with a completeness notice. During the intervening 13 months, all of the substantive permit issues have been resolved. These issues include Ambient Air Impacts, appropriate BACT, air quality and/or visibility impacts on Class I Areas, impacts on soils and vegetation, Endangered Species Act compliance. The only unresolved issues center on permit conditions which will be addressed in later comment in this letter. Because further discussion on permit language may well occur, additional information and/or data may have to be submitted after the close of the comment period.

2.

### Draft Permit Conditions - Winfow Rock Compressor Station

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#### IV Malfunction

Window Rock is a remote, El Paso Natural Gas facility. In the event of malfunction, El Paso will make every effort to meet the telephonic and written requirements specified in this condition. However, the record must indicate that weather conditions (especially during the winter months) may prevent El Paso's service technicians from being able to assess the nature of problems being encountered, particularly as they might relate to a CEM system. El Paso would expect permit language to reflect this reality.

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#### VIII Other Applicable Regulations

Solar has indicated a desire to submit addition information for the record explaining the New Source Performance Standards (NSPS) that may apply to turbines.

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#### IX Special Conditions

##### A. Certification

El Paso's willingness to accept the condition to notify EPA in writing of compliance with Special Condition IXB and IXE is linked to our later comments on CEM (Permit Condition IXE). El Paso does not question the need for the Agency to ask for any and all information that would be helpful to verify that permit conditions are being met.

El Paso's concern with this specific permit condition is not the need for status reports on the project and its many parts, but more whether a CEM is the only appropriate method for determining continuing compliance.

El Paso welcomes the opportunity to report as specified on the status and/or progress of the low NO<sub>x</sub> combustor development.



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### IX C Performance Test 1a and 1b

As a result of our October 2, 1991, meetings El Paso would like to propose an alternative to annual testing for NO<sub>x</sub> and CO. As you are aware, and as so stated in the meetings, El Paso is convinced that our vendor (Solar Turbines) has a useful, reliable alternative to CEMs that utilizes the parameters that describe the continuing operation of natural gas fired turbines. This method is most appropriate at remote unattended sites.

It would appear that the Agency position is that emissions tests (not CEMs) provide the only truly acceptable data to verify emission rates. As later explained, El Paso offers to perform emissions tests more frequently than annually during the first year at a minimum. The most logical frequency would be quarterly to address the varying site temperature and humidity conditions. This offer is tied to the opportunity in permit language to present an alternative continual compliance method. The specifics on what constitutes an opportunity and the meaning of alternative continual compliance is better explained in our specific comments or Special Condition IXE.

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### IX C 2 Performance Tests for NO<sub>x</sub> and CO

El Paso does not object to the methods specified; we ask only that EPA method 19 be allowed as an additional alternative where appropriate.

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### IX D Emission Limits; NO<sub>x</sub>

The permit should state that the installation of the low NO<sub>x</sub> combustor will be at the "first overhaul after July 1994". This correction would then make the permit condition consistent with the vendor commitment (see December 6, 1990, letter Solar Turbines, Inc. to Mr. Loren Gearhart submitted on January 15, 1991).

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### IX D Emission Limits: Opacity

El Paso submitted documentation and during the meeting further discussed the operational realities of natural gas fueled gas transmission turbines which, we firmly believe, show that opacity in the exhaust is not a valid permit consideration. We trust that you concur.

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### IX E Continuous Monitoring

First, Opacity should no longer be a consideration for CEM operation for the reasons stated above.

The CEM issue has proven to be the most vexing issue in the acquisition of the permit for Windor Rock Station (AZP 90-1) as well as the two other PSD permits being sought concurrently from EPA Region IX. The other permits are for Navajo (AZP 90-2) and Dilkon (AZP 90-3).

El Paso's concern with CEM's centers not on the requirement to continually verify, to the Agency's satisfaction, that emissions limitations are not being exceeded but more on the probable compliance problems that will result from the operation of such a sophisticated piece of equipment (the CEM) at remote unattended compressor station sites. Particularly troubling is the reality that the "care and feeding" of such a system will be expensive and in the end the data being generated is not totally acceptable to EPA IX unless frequent (annual) independent verifications are performed utilizing emissions testing procedures specified in 40 CFR Part 60. El Paso remains concerned that acceptance of a permit condition requiring the unconditional installation of a CEM (especially a CEM system defined in EPA NSPS regulations) will lead to compliance problems caused by the CEM and/or related hardware and instrumentation and not the source (the turbine) itself.

The CEM issues are further complicated by the Region IX "policy" that most, if not all, PSD permits will contain a CEM requirement. The facts are that other jurisdictions, such as EPA Region X, the state of Pennsylvania, and the South Coast Air Quality Management District have moderated CEM requirements because of problems their permittees have experienced.

As you are aware, El Paso has been working for the last 12 months to obtain a PSD permit for its White Rock Compressor Station located on the Navajo Indian Reservation. On October 1, EPA Region VI issued the permit (PSD-NM-1000) to construct at that facility. Interestingly, it is our understanding that EPA Region IX will be the enforcement Agency for PSD-NM-1000. This situation arises because of a Memorandum of Agreement (MOA) signed in late 1990, specifying that from October 1990 on Region IX would be the permitting and enforcement authority for permits on the Navajo Reservation irrespective of whether the facility was in Arizona or New Mexico. (The Navajo Reservation covers portions of New Mexico, Arizona, and even Utah.) We understand that EPA VI retained permitting jurisdiction for White Rock because the application processing had commenced prior to the effective date of the MOA. The 30 day comment period for PSD-NM-1000 ended on September 24, 1991 and on October 1, 1991 EPA issued the final permit subject only to the provisions of 40 CFR 124.19. The wording in the draft permit and the final permit are identical and on the CEM issue Region VI specified in Permit Condition #13 the following:

"The holder of this permit shall perform a compliance stack test annually for NO<sub>x</sub>, CO and Opacity on Units 1 and 2. After at least one year of operation, the holder of this permit may submit, to the appropriate EPA Regional Office for approval, an amendment of the protocol to include one of the following: A compliance test to be conducted every two or three years; a test to be conducted every quarter with a portable monitor; or a customized monitoring method approved by the appropriate EPA Region."

As you can see, El Paso will be expected to perform a compliance stack test annually for NO<sub>x</sub>, CO, and Opacity. El Paso has the right to submit to EPA Region IX for approval an amendment to this provision covering three

options. We are particularly interested in the third option (a customized monitoring method) but have not ruled out the other two completely especially if the information developed during the annual test and other emissions tests prove our thesis that natural gas fired turbine emissions do not vary significantly with time and are predictable.

With the previous as background, El Paso now wishes to focus the CEM comments on Window Rock Station specifically. An argument could be made that the conditions found in PSD-NM-1000 were accepted, at least tacitly, by Region IX. Further that argument could say that this tacit approval would mean that the exact language found in condition #13 should be used in the Navajo permit. Such argument invites acrimony, mistrust, and reprisal when EPA IX considers, for approval, the alternatives to annual emissions tests allowed in the White Rock permit.

El Paso would, of course, be more than willing to commit to annual tests for the next twenty or thirty years as one way to avoid the "compliance problems" anticipated by installing and operating a CEM system. But even eternal annual testing is not the best answer. EPA VI was sensitive to this "problem" and the permit language reflect an understanding of our turbine. Insistence on only annual test, no matter how pragmatic, ignores Region IX "policy". In our many discussions on the CEM issue it is clear that all Region IX wants is to be assured that its permittees are in compliance with permit conditions and that inspectors who review compliance on-site, can be satisfied with hard data that continual compliance is occurring. These Agency objectives and El Paso objectives are actually the same. Because we will meet those objectives El Paso is willing to install a CEM system at Dilkon, conduct frequent initial independent verifications of the CEM data and alternative compliance calculations being produced, and asks only in return for permit language that provide the opportunity to use the verified data base that will be developed to demonstrate for Agency approval that an alternative control compliance method is just as good or better.

With regards to Window Rock Station, an independently verified (through concurrent emissions test) CEM data base already exists or can be obtained long before the CEM has to be operating. Moreover, during Solar's presentation they showed that they have predicted emissions on a water injected Centaur H utilizing their PEM system. The PEM is providing real time data. That data has in turn been used to specify water injection rates on the water injected turbine. The accuracy of these PEM calculations has been verified by a CEM (within the accuracy of the CEM system). Clearly the accuracy of the PEM system can be inferred from the fact that the water injection rates are correct. El Paso is so confident that the PEM system for NO<sub>x</sub> being championed by Solar will work, that a commitment could be made to install the CEM system which actually won't ever be required (to satisfy the Agency concerns about continual compliance so that a permit can finally be issued) provided that El Paso in turn is given through permit language the opportunity to demonstrate for Agency approval that an alternative also works (to satisfy El Paso's short-term concern about "compliance" problems not actually related to the source itself and to have a long-range solution to

continuous emissions monitoring requirements at remote, unattended locations).

In simple terms, here is how we see the issue being resolved.

1. The agency finally issues a permit requiring that a CEM be placed, but adds language that an alternative such as a customized monitoring method may be submitted for approval. A one year operations history before approval would not allow El Paso to make the alternative demonstrations we know we can make before a CEM must be installed.
2. El Paso begins building the facility, but also begins compiling all the data correlating PEMs to CEMs including independent verification via emissions test. El Paso will submit the data to EPA for review.
3. El Paso finishes construction in March or April, 1992. Most permits allow 180 days after commencement of operations to perform compliance tests.

During the first 90 days, El Paso validates PEMs calculated values at Window Rock with actual emissions test. This data plus other Solar data will prove conclusively that PEMs work.

4. Assume that EPA Region IX is not satisfied with PEMs verifications because it does not reflect climatic and temperature changes over a full year. El Paso will have emissions tests performed frequently (quarterly) throughout the year to verify compliance in lieu of a CEM. Such frequent testing will also validate the PEM with the kind of data (emissions tests) preferred by EPA. The financial incentive to El Paso is that less money will be spent on frequent emissions test than on CEM hardware and its O&M costs. This is especially true over a 20 year period. The incentive to EPA is that very frequent emissions testing will be performed as an alternative to a CEM that will validate compliance. The Agency indicated that CEM is actually the second preferred method when compared to emissions test data. Natural gas turbines just do not change emissions characteristics and this will be borne out by the frequent testing.

Should the PEM not meet Agency approval, the permit will always have the CEM as the fall back.

It is conceivable that the Agency totally rejects El Paso's request to use permit language providing for the opportunity to demonstrate alternatives. Such an action would be as inappropriate as El Paso insisting that EPA is legally "required" to replicate permit language tacitly accepted in PSD-NM-1000. El Paso has offered a middle ground which we believe meets both the Agency policy and enforcement concerns and yet leaves open the opportunity for progress and innovation to find a better way to do continuous emissions monitoring on natural gas transmission turbines.

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As we discussed at the meeting, one of the fundamental problems with most CEM system is the measurement of volumetric flow rates. Pitot tubes often do not provide reliable outputs. Accordingly, El Paso must request this permit condition be changed so that alternative exhaust flow measurement can be obtained by using fuel or other surrogates, if required.

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F Fuel Use

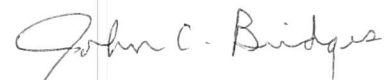
Based on our discussions it is El Paso's understanding that hourly fuel use as expressed in this condition will be determined by taking the actual fuel at the current temperature and correcting it to 59° F.

Finally, El Paso would greatly appreciate the opportunity to review any revised draft permit that will be written following our meeting. You voiced no objection to this approach. Because of the many technical issues that have been raised in this letter we feel that a possibility exists that final permit language could result that is not consistent with our many written and verbal discussions. Moreover, every day that passes without a final permit to construct is costing us and the rate-payers money. We see the opportunity to review the next draft of the permit as the best way to expedite our mutual understandings of the final permit language. As was stated in our meeting, El Paso is dedicated to working with the Agency and the opportunity to review the final Window Rock permit before it is signed would be consistent with that pledge. A FAX copy of the draft final permit would be more than acceptable and comments will be returned quickly. [El Paso FAX #(915) 541-5946.] All we are asking is the opportunity to facilitate some of the concluding activities that will result in a final permit.

All of the substantive PSD issues for Navajo have long since been resolved. These issues include a demonstration of acceptable ambient air impacts and what constitutes BACT. The only uncertainty remaining is CEM language in the permit. If the Agency acts as we have suggested, a permit to construct could be available by October 11, 1991. The burden of proof that PEM works is on El Paso and Solar. In any case, the Agency can be assured that if the demonstrations for PEMs are not satisfactory, the Agency does not have to approve the alternative and a CEM will be installed. At this very moment Solar is examining their emissions information to find CEM derived emissions rates that have been verified with emissions tests. We anticipate that the exact information can be found or quickly developed.

El Paso appreciated the opportunity to comment on this permit and the courtesies extended by you and Steven Frey during our meeting on October 2.

Sincerely,



John C. Bridges  
Environmental Consultant  
El Paso Natural Gas

cc: Steven Frey